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between INRs and IRs, but also with the wider stroke team. The results of our survey demonstrate that there is willingness in the IR community to train in MT to help deliver this service. In our own Trust, we have adopted this approach and have trained one IR to be independent in MT with two other IRs also in training. There is also recognition that in order to maintain sufficient numbers of elective cases for INRs elective a balance must be struck between enabling a full 24/7 on-call service and for each individual operator to maintain a sufficient case load to ensure a high level of expertise for other neurointerventional procedures. We believe that in order to fulfil the ambitious goal of the NHS Long Term Plan of delivering a 10-fold increase by 2022 in the proportion of patients who receive a thrombectomy that INRs and IRs must work in cooperation to provide this highly effective and life-changing treatment.

## Conflict of interest

The authors declare no conflict of interest.

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## Ultrasound in COVID-19: a timeline of ultrasound findings in relation to CT



Sir—The novel coronavirus (Sars-Cov-2) produces a mild to severe lower respiratory tract infection that is commonly identified by imaging in affected patients, in some cases even before symptom development.<sup>1</sup> Computed tomography (CT) has been the primary imaging method evaluated to date and is often being recommended as a screening tool for patients suspected of having COVID-19.<sup>2</sup> Lung ultrasound is an alternative imaging method with emerging evidence that supports its ability to identify characteristic lesions seen in COVID-19 that are highly consistent with CT imaging,<sup>3,4</sup> without many of the downsides. For clinicians wishing to use ultrasound in the management of patients with COVID-19, it is important to understand the characteristic findings and the timeline in which they would occur. These are described below in comparison to CT.

It is estimated that lung abnormalities present early in the course of disease with bilateral, basal, and peripheral involvement in approximately 50–75% of patients<sup>5,6</sup> and occur in identifiable stages. Using CT, Jin *et al.* described five temporal stages of the disease in the lungs as ultra-early (asymptomatic, 1–2 weeks after exposure), early (1–3 days from symptom presentation), rapid progression (3–7 days from symptom presentation), consolidation (7–14 days from symptom presentation), and dissipation (2–3 weeks after symptom onset), each occurring with associated findings.<sup>1</sup> Similar categories were described by Pan

*et al.* with the exception of a pre-symptomatic phase.<sup>7</sup> CT findings begin as single or multifocal ground-glass opacities, pulmonary nodules, or air bronchograms, which progress with development of interlobular septal thickening and crazy paving, before regression in both size and density at the end of the second week of infection. Opacities often have extensive distribution, typically bilaterally, but also seen unilaterally, with occasional round morphology or reversed-halo or atoll sign.<sup>5</sup> In the dissipation phase, there may be continued patchy consolidative opacities in addition to reticular “strip-like” opacities, bronchial wall thickening, and interlobular septal thickening.<sup>1,8</sup>

The characteristic ultrasound findings (bilateral and multilobar B-lines, subpleural consolidates, irregular pleural line, and decreased blood flow<sup>3,4,9</sup>) have been shown to be highly consistent with CT findings<sup>3,4</sup> and can be expected to develop over a similar timeline. During the first few days of symptom presentation, scattered unilateral or bilateral multilobar B-lines can be visualised.<sup>3,9</sup> As the disease progresses from the end of week 1 through week 2, development of alveolar interstitial syndrome with diffuse, bilateral B-lines can occur in addition to an irregular pleural line with punctate defects and formation of subpleural consolidations with visible air bronchograms. Lastly, after the end of week 2 during convalescence, there can be an expected regression of prior findings with re-emergence of A-lines.<sup>9</sup> A summary of findings is listed in Table 1.

Although the literature remains limited, there is still a clear benefit for clinicians to be familiar with ultrasound findings and their progression in COVID-19 patients. It may be particularly useful in helping emergency personnel to triage and diagnose suspected patients,<sup>4</sup> but also for monitoring progression of the disease throughout hospitalisation. Additionally, it offers substantial benefits in comparison to CT imaging, including portability, lower cost, reduced radiation, and ease of sterilisation. Physicians are

encouraged to be familiar with and to utilise lung ultrasound in the management of COVID-19 patients.

## Conflict of interest

The author declares no conflict of interest.

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## Impact of gender on extent of lung injury in COVID-19



Sir—Data from the World Health Organization (WHO) and China indicate significant higher mortality rates in male patients with coronavirus disease 2019 (COVID-19)<sup>1,2</sup>; however, this gender gap is far less noticeable when it comes to the prevalence of COVID-19 infection, indicating that women are as likely as men to contract the virus but are

**Table 1**

Timeline of common findings of COVID-19 in computed tomography (CT) and ultrasound.<sup>1,3–9</sup>

Symptom onset (days)	CT	Ultrasound
0–3	Single or multiple scattered and patchy GGO, patchy grid-like thickness of interlobular septa	Unilateral or bilateral focal B-lines
3–7	Fused and large-scale consolidation with internal air bronchograms, crazy-paving pattern, multi-lobe GGO	Bilateral diffuse B-lines with irregular pleural line and punctate defects, subpleural consolidations, air bronchograms
7–14	Multiple patchy consolidations that are reduced in size and density, crazy-paving pattern	
14–21	Reduced patchy consolidations, strip-like opacities, grid-like thickening of interlobular septum, minimal crazy paving	Resolving consolidations, A-lines

GGO, ground-glass opacity.